Threatened Species Assessment

Asplenium hookerianum
Maidenhair Spleenwort

Taxonomy

Asplenium hookerianum Colenso

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1997).

Categorised as Endangered in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

Rhizome short, covered with dark brown, shiny scales with long fine tips. Fronds tufted, erect to spreading, 5-20 cm long, with scattered red-brown scales extending up stipe, rachises and veins. Stipe shorter or longer than lamina, slender, grooved, brown below, green above. Lamina oblong-triangular, 1-2-pinnate (if 1-pinnate, then basal pinnae usually divided), mid-green to dark green, membranous; rachises slender, green, grooved. Pinnae with slender stalks; pinnules obovate to triangular, c. 3-10 cm long, bluntly toothed or deeply lobed; veins obscure except for raised midvein. Sori short, oblong, oblique to midvein, not reaching margin; indusium oblong, membranous, opening towards centre of pinna.

Generation Length

The generation length of *Asplenium hookerianum* is suspected to be 10 to 45 (midpoint 25) years. This is a small fern (to 20 cm tall) that may be expected to reach maturity in around 3 years. Larger *Asplenium* species are known to reach 40 years in cultivation (Dyer 2013). However, much smaller species that may also be killed by drought episodes are not expected to get nearly as old.

Distribution

The taxon occurs in Bryce Gorge below Conglomerate Falls and on the East Caledonia River. Also in NSW, Tas and New Zealand.

Habitat

In Victoria, *A. hookerianum* occurs on rock faces with sheltered east and south-east aspects, and within the rock face habitat the species is confined to cracks in the rock surface under small overhangs and in vertical and horizontal crevices. The populations are at an altitude of 1,200 m and average rainfall is in excess of 1,400 mm/year. The substrate is Lower Carboniferous quartzose and feldspathic sandstone and siltstone (Snowy Plains Formation). Associated flora species consist of an overstorey containing Candlebark *Eucalyptus rubida* and understorey trees of Mountain Tea-tree *Leptospermum grandifolium*. On the rockface habitat where *A.hookerianum* occurs, the characteristic species are the rare Cliff Cudweed *Euchiton umbricola* and Common Spleenwort *A.*

trichomanes. Also common are Necklace Fern *A. flabellifolium*, Slender Tussock-grass *Poa tenera*, Mother Shield-fern *Polystichum proliferum*, Brittle Bladderfern *Cystopteris tasmanica* and several moss taxa.

Threats

Intensifying land use upstream of the sites may have had an impact. The habitat of *A. hookerianum* being largely confined to cracks and crevices in rock faces, plants may be adversely affected by rock climbing or abseiling activities for the Bryces Gorge population. With *A. hookerianum* restricted to moderately cold and wet environments in Tasmania and Victoria, it is reasonable to assume that it is threatened by long-term climate change, with projected impacts of decreasing rainfall and increasing temperatures and drying.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a*) *cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion A2 as Endangered

The population reduction over the past 30 to 135 years is suspected to be 20 to 60% (midpoint 40%), based on (a) and (c) above.

Comparison of surveys conducted around 10 years ago and visits to the Bryce Gorge site more recently suggested that the number of individuals in total had not decreased, however the impacts of the 2019/20 bushfires are believed to have impacted more than 80% of the taxon's habitat, and are likely to have led to some plant mortality.

Eligible under Criterion A3 as Endangered

The population reduction over the next 30 to 100 years is suspected to be 30 to 90% (midpoint 50%) based on (c) above.

This is based on the likely increases in fire frequency and intensity, as a result of climate change. Declines in subpopulations (the East Caledonia River population closest to the road crossing) that may occur again as a result of similar factors such as fire. The effects of increased temperatures and the likelihood of drought may drive further declines.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

Individuals of the taxon is estimated to be severely fragmented, considering the limited dispersal ability of the taxon, the barriers to dispersal, or lack of habitat separating them.

All populations are within 6 km of each other and are all considered part of a single location, and all are subject to the key threat of increased fires. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has one location and has a continuing decline in (i), (ii), (iii), (iv) and (v).

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Eligible under Criterion C as Endangered

It is estimated that there are 470 to 570 mature individuals, but other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Eligible under Criterion D as Vulnerable

It is estimated that there are 470 to 570 mature individuals. The range of values represents uncertainty that the surveyors (Perrie et al. 2010) had when counting a large number of individuals

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

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Sutter G. (2009) *National Recovery Plan for the maidenhair spleenwort Asplenium hookerianum*. Melbourne: Department of Sustainability and Environment. Retrieved from: https://www.environment.gov.au/resource/asplenium-hookerianum-maidenhair-spleenwort

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